

**VERSION WITH MARKINGS TO SHOW CHANGES MADE:**

**IN THE CLAIMS:**

Claims 2 and 3 have been canceled.

Claims 1 and 4 have been amended as follows:

1. (Amended) A 3-phase permanent magnet synchronous motor comprising a stator and a permanent magnet excited rotor, said stator formed with nine slots for receiving for each of the 3 phases a two-layer [including a] winding with a pitch factor of 7/9 [which] and made of 3 consecutively arranged prefabricated coils, with each coil having a width of two slot pitches [has cyclically repeating winding factors

$|\xi_p| = 0.945$ ,  $|\xi_{5p}| = 0.140$ , and  $|\xi_{7p}| = 0.060$ , and a skew angle  $\gamma = \frac{2\pi}{18p}$ , wherein

p is the number of pole pairs].

4. (Twice amended) The permanent excited synchronous motor of claim 1, wherein [the stator includes a laminated core with a plurality of slots,] each slot [defining] defines a slot gap and a slot width, wherein a width of the slot gap is at least half of the slot width.

## REMARKS

The last Office Action of September 10, 2002 has been carefully considered. Reconsideration of the instant application in view of the foregoing amendments and the following remarks is respectfully requested.

Claims 1 to 6 are pending in the application. Claims 1 and 4 have been amended. Claims 2 and 3 have been canceled. Enclosed is also a marked-up version of the changes made to the claims by the current amendment. The enclosed page is captioned **"VERSION WITH MARKINGS TO SHOW CHANGES MADE"**.

Claims 1-3 and 5 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Koichi, of record.

Claims 4 and 6 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Koichi in view of Van Hout et al., of record.

The rejection of claims 1 and 5 under 35 U.S.C. §103(a) as being unpatentable over Koichi is hereby traversed and reconsideration thereof is respectfully requested in view of the amendments to claim 1 and the remarks set forth below. The rejection of claims 2 and 3 has become moot by canceling these claims.

Independent claim 1, as amended herein, is directed to a 3-phase permanent magnet synchronous motor comprising a stator and a permanent magnet excited rotor. The stator is formed with nine slots for receiving for each of the 3 phases a two-layer winding with a pitch factor of 7/9 and made of 3

consecutively arranged prefabricated coils, with each coil having a width of two slot pitches. Claims 4-6 depend from claim 1.

Applicant has amended claim 1 to incorporate the actual winding pattern depicted in Fig. 2. Subject matter previously recited in claims 2 and 3 has been included in amended claim 1. More particularly, the pitch factor of  $7/9$  is now recited in claim 1. As described in paragraph [0010] of the specification, the winding arrangement disclosed in the present invention is particularly suited for small-size, high-speed four pole synchronous spindles. This winding arrangement in conjunction with a mutual skew between the rotor and the stator optimally suppresses torque ripple. Slot latching is therefore encountered only as of the fourth slot harmonic.

Although Koichi discloses a 4-pole permanent magnet rotary electric machine with a field core 1, permanent magnets 21-24, an armature core 3, an armature winding 4, and teeth 51-59, with the stator having  $NS = 9$  slots, none of the Figs. 1-5 of Koichi teaches the specific electrical connections of the 2-layer stator windings, as shown in detail in Fig. 2 of the specification.

The examiner cites *in re Aller* to justify his assertion that the subject matter of claim 1 is obvious over Koichi, stating that "discovering an optimum value or workable range by routine experimentation" is not inventive. However, one example previously cited by the examiner, Broadway (US Patent 5,723,930) discloses exactly such specific winding method which was deemed not to be obvious.

Applicant therefore submits that the specific winding pattern recited in amended claim 1 cannot be arrived at by routine experimentation and is therefore patentable over the art of record. Accordingly, claim 5, which depends from claim 1, should also be patentable.

Claims 4 and 6 were rejected under 35 U.S.C. §103(a) as being unpatentable over Koichi (JP 62-185545) in view of van Hout et al. (U.S. Patent 5,030,864).

Van Hout et al. does not specify the winding arrangement and hence does not disclose subject matter material for the patentability of claim 1. Since claims 4 and 6 depend from claim 1, these claims should also be patentable over the Koichi and Van Hout references, either taken alone or in combination, for the same reason that claim 1 is patentable.

For the reasons set forth above, it is applicant's contention that neither Koichi nor van Hout et al., nor a combination thereof teaches or suggests the features of the present invention, as recited in claim 1.

As for the rejection of the retained dependent claims, these claims depend on claim 1, share its presumably allowable features, and therefore it is respectfully submitted that these claims should also be allowed.

Withdrawal of the rejection under 35 U.S.C. §103(a) and allowance of claim 1 and 4-6, are thus respectfully requested.

Applicant has also included a communication to the draftsperson, as requested by the Examiner.

In view of the above presented remarks and amendments, it is respectfully submitted that all claims on file should be considered patentably differentiated over the art and should be allowed.

Reconsideration and allowance of the present application are respectfully requested.

Should the Examiner consider necessary or desirable any formal changes anywhere in the specification, claims and/or drawing, then it is respectfully requested that such changes be made by Examiner's Amendment, if the Examiner feels this would facilitate passage of the case to issuance. If the Examiner feels that it might be helpful in advancing this case by calling the undersigned, applicant would greatly appreciate such a telephone interview.

Respectfully submitted,

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